

Colliding-Jet Fluidic Actuators for Active Flow Control, Phase I Project

SBIR/STTR Programs | Space Technology Mission Directorate (STMD)



ABSTRACT

We propose a novel method of producing sweeping jets using a simplified geometry that is very short in stream-wise length and no feedback channels inside. This rugged design is expected to be more efficient, occupies about 50% less space (and hence less weight) when scaled-up compared to the existing feedback-oscillator-based actuators and hence offers advantages in developing a flow control system that can be more suitable for integration into aerodynamic configurations. In Phase I, we propose to optimize the geometry for stable operation with high momentum output, and minimum streamwise length. Scaling studies will be conducted for the best design to obtain scaling laws for scale-up to full-scale. We will also develop concepts of actuator arrays with integrated plenum chamber. In Phase II, we plan to demonstrate the use of these actuators for flow control in a blended wing or on a thin airfoil flap.

ANTICIPATED BENEFITS

To NASA funded missions:

Potential NASA Commercial Applications: The proposed actuators have potential for Active Flow control, mixing of fluids, Jet Noise control in NASA's aerodynamic applications.

To the commercial space industry:

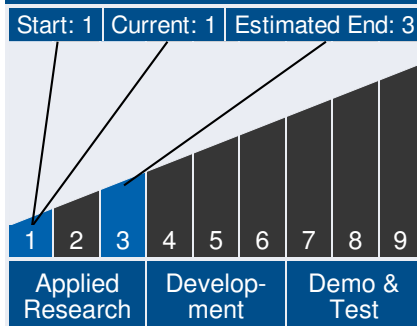
Potential Non-NASA Commercial Applications: The proposed actuators have application in the flow physics and flow control, applied aerodynamics programs for advanced aerodynamic design of air vehicles.



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Technology Maturity



Management Team

Program Executives:

- Joseph Grant
- Laguduva Kubendran

Program Manager:

- Carlos Torrez

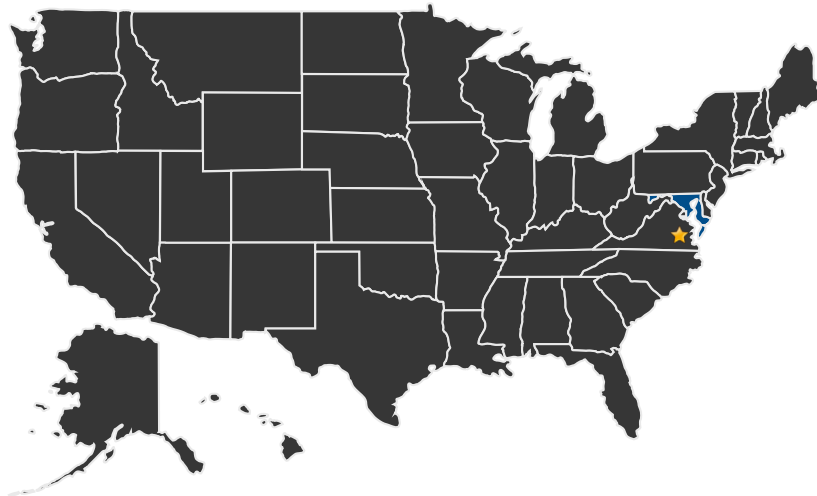
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U.S. WORK LOCATIONS AND KEY PARTNERS



■ U.S. States
With Work

★ **Lead Center:**
Langley Research Center

Management Team *(cont.)*

Principal Investigator:

- Surya Raghu

Other Organizations Performing Work:

- Advanced Fluidics, LLC (Ellicott City, MD)

PROJECT LIBRARY

Presentations

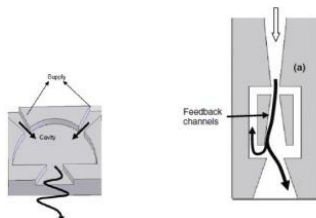
- Briefing Chart
 - (<http://techport.nasa.gov:80/file/23562>)

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IMAGE GALLERY



Figures 1. Colliding-jet fluidic actuator (Ragho, 2013) Figure 2. Relative size of a feedback fluidic actuator of similar flow rates (Ragho, 2013)

*Colliding-Jet Fluidic Actuators for
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DETAILS FOR TECHNOLOGY 1

Technology Title

Colliding-Jet Fluidic Actuators for Active Flow Control, Phase I

Potential Applications

The proposed actuators have potential for Active Flow control, mixing of fluids, Jet Noise control in NASA's aerodynamic applications.